PATENT ABSTRACTS OF JAPAN

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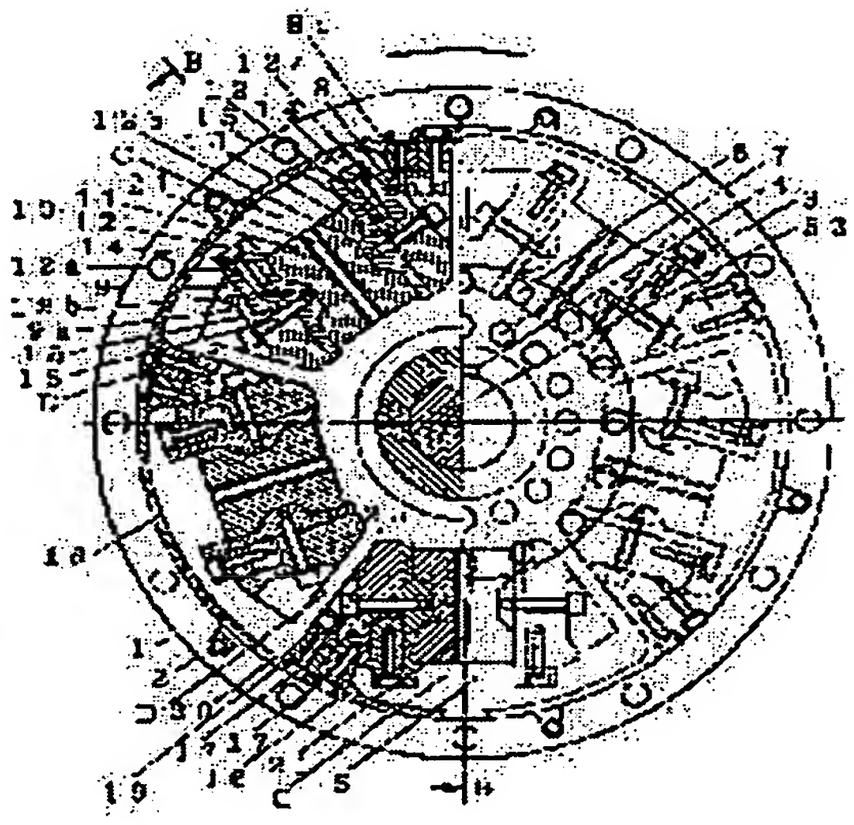
(54) COMPRESSION TYPE ELASTIC JOINT UNIT

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a compression type elastic joint unit in which generation of play owing to aging is prevented, fretting of a joint surface in an elastic body is restrained, durability is improved, mass of the whole of the unit is reduced, no mechanical equipment need not be transferred when the elastic body is replaced to thereby make its replacement easy, thus allowing excellent maintenability.

SOLUTION: A driving shaft 51 end and a driven shaft 52 end are coaxially spaced at predetermined intervals in an axial direction and a plurality of driving side ribs 8 are spaced uniformly in a circumferential direction of a driving side flange 2 that is provided integrally and rotatably with the driving shaft 51 end and in a protruding manner to a driven shaft side. Besides, a plurality of driven side ribs 9 are spaced uniformly in a circumferential direction of a driven side flange 5 that is provided integrally and rotatably with the driven shaft 52 end so as not to interfere with each of the driving side ribs 8 and in a protruding manner to a driving shaft side. The elastic body 10 for drive train is inserted, in a radial direction from outer peripheral sides of both flanges 2 and 5 to the center of the shafts, into a space C between the driving side ribs 8 and the driven side ribs 9 that both correspond to each other, resulting in lying therebetween.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] While protruding two or more driving-side ribs on the circumferencial direction of a driving-side flange which opened predetermined spacing in shaft orientations, has arranged the driving shaft edge and the follower axis end on this mandril, and really prepared them in said driving shaft edge pivotable to a follower shaft side at regular intervals And two or more follower side ribs are protruded to a driving shaft side. the circumferencial direction of the follower side flange really prepared in said follower axis end pivotable -- regular intervals -- so that it may not interfere with said each driving-side rib Compression mold elastic-axis joint equipment characterized by having turned the elastic body for power transfer to the axis from the periphery side of said both flanges, having fitted in radial and interposing in the space section of said corresponding driving-side rib and said follower side rib.
[Claim 2] Said elastic body is compression mold elastic-axis joint equipment according to claim 1 characterized by joining to one, equipping with an abbreviation tabular fixing metal the both-sides side arranged in contact with said driving-side rib and said follower side rib, and being fixed through a bolt in the periphery side of each fixing metal, and the radial location to said driving-side rib and said follower side rib, respectively.
[Claim 3] Compression mold elastic-axis joint equipment according to claim 1 or 2 characterized by really connecting both the flanges and ribs by the side of said driving side or said follower pivotable by the cylinder-like covering member. [both / either or]
[Claim 4] Compression mold elastic-axis joint equipment according to claim 3 characterized by penetrating and drilling two or more paths for cooling air in said elastic body and said cylindrical covering member while making said elastic body face and preparing opening for cooling air in said one [at least] flange.
[Claim 5] Claims 1-4 characterized by the body (part except said fixing metal) of said elastic body consisting of natural rubber, synthetic rubber, or elasticity resin are compression mold elastic-axis joint equipment of a publication either.
[Claim 6] Claims 1-5 characterized by having interposed said elastic body in one space section between said driving-side rib and said follower side rib, and making a spring device placed between the space sections of another side are compression mold elastic-axis joint equipment of a publication either.
[Claim 7] Claims 1-6 characterized by constituting the part of said two or more elastic bodies with the shock absorber which has a damping function are compression mold elastic-axis joint equipment of a publication either.
[Claim 8] Claims 1-7 characterized by arranging the gap metering device which measures the amount of permanent deformation of the body of said elastic body ranging over between said driving-side rib which interposes said elastic body in one space section between said driving-side rib and said follower side rib, and forms the space section of another side, and said follower side ribs are compression mold elastic-axis joint equipment of a publication either.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the compression mold elastic-axis joint equipment which transmits power, making it deform in the direction which compresses the elastic body which interposed driving force like a diesel power plant to change between I/O shafts in detail about the elastic-coupling equipment for making it decrease with an elastic body.
[0002]
[Description of the Prior Art] The equipment A of a publication is in the advanced technology about this kind of compression mold elastic-coupling equipment at JP,7-27142,A. This equipment A is a two-step torsion elastic coupling, the low elastic body of torsional rigidity is arranged at core approach, and the high elastic body of torsional rigidity is arranged at periphery section approach. And at the time of low torque, power is transmitted to a follower side through the elastic body of core approach from a driving-side flange, and if a load becomes large, it will consist of structure where power is transmitted to a follower side through the elastic body by the side of a periphery with the elastic body of core approach.
[0003] The equipment D of a publication is shown in Equipment C, the Germany JP,3432436,B specification, and a drawing given in Equipment B, the Germany JP,29716165,B specification, and a drawing given in other advanced technology at the Germany JP,2624500,B specification and a drawing.
[0004]
[Problem(s) to be Solved by the Invention] However, there is room which should be improved in respect of the following, respectively in equipment I given in each above-mentioned official report etc. - NI. Namely, ** equipment I: Since neither of the elastic bodies, core approach nor periphery section approach, is being fixed, an elastic body ages in many years past, contract by plastic deformation, and it is easy to produce backlash (clearance) between input shafts and between output shafts.
[0005] Since it is arranged in the gap a driving side and by the side of a follower at shaft orientations, or an elastic body moves relatively the machine a driving side and by the side of a follower to shaft orientations at the time of inclusion of an elastic body and exchange, it is necessary to secure an open big tooth space, check takes time and effort, and its maintenance maintainability is bad.
[0006] The device which cools an elastic body is not given, therefore fatigue strength is low.
[0007] ** Equipment RO Ha : there is a possibility of aging in [an elastic body] many years past since the elastic body interposed between I/O shafts (a driving shaft and follower shaft) is not being fixed mechanically, contracting by plastic deformation, and an allophone occurring or giving an impact load to the output-shaft side from an input-shaft side with backlash generating in backlash arising between an input shaft and an output shaft ****.
[0008] The mass of the whole equipment is large.
[0009] The aging condition of an elastic body cannot be checked easily. Moreover, since it is arranged at the shaft orientations between I/O shafts, or an elastic body moves the machine of an I/O shaft to shaft orientations greatly relatively in the case of exchange of an elastic body, it is necessary to secure an open big tooth space, check takes time amount, and maintenance maintainability is bad

[an elastic body].
[0010] The cooler style is not given to an elastic body, but fatigue strength is low.
[0011] ** Equipment NI : although especially the orientation of the elastic body between I/O shafts is not indicated, it is arranged structurally at shaft orientations, judging from the drawing. For this reason, it is necessary to move the machine of an I/O shaft to shaft orientations greatly relatively in the case of exchange of an elastic body, and to secure an open big tooth space like each above-mentioned equipment I - Ha, check takes time amount, and maintenance maintainability is bad.
[0012] The cooler style is not given to an elastic body, but fatigue strength is low.
[0013] This invention is what solves the fault in the above-mentioned elastic-coupling equipment of the former (an official report publication is included). 1. Prevent generating of backlash by aging of an elastic body, and generating of the allophone by it. Raise the fatigue strength of an elastic body which prevents fretting of the plane of composition of an I/O shaft and the metallic ornaments of an elastic body. Adjustment of the damping effectiveness of a joint is made easy. - Migration of a machine is unnecessary at the time of the exchange of an elastic body which endurance improves by things and makes mass of the whole 2. equipment small. The aging condition of an elastic body that exchange becomes easy can be grasped easily. - It aims at offering the compression mold elastic-coupling equipment which was excellent in maintenance maintainability with things.
[0014]
[Means for Solving the Problem] The compression mold elastic-coupling equipment applied to this invention in order to attain the above-mentioned purpose While protruding two or more driving-side ribs on the circumferencial direction of a driving-side flange which opened predetermined spacing in shaft orientations, has arranged the driving shaft edge and the follower axis end on this mandril, and really prepared them in said driving shaft edge pivotable to a follower shaft side at regular intervals And two or more follower side ribs are protruded to a driving shaft side. the circumferencial direction of the follower side flange really prepared in said follower axis end pivotable -- regular intervals -- so that it may not interfere with said each driving-side rib It is characterized by having turned the elastic body for power transfer to the axis from the periphery side of said both flanges, having fitted in radial, and interposing in the space section of said corresponding driving-side rib and said follower side rib.
[0015] Since an elastic body can be drawn out and exchanged for radial at the time of the exchange at the time of an elastic body deteriorating, for example since each elastic body interposed in the space section between a driving-side rib and a follower side rib was turned and fitted in the axis from the periphery side according to the compression mold elastic-axis joint equipment of this invention which has the above-mentioned configuration, it is not necessary to move a driving-side machine and a follower side machine, and exchange is easy and possible for a short time. And since the exchange stage of an elastic body etc. can be easily grasped by checking the conditions (the loaded condition under operation, extent of aging, etc.) of an elastic body visually from the periphery side between a driving-side flange and a follower side flange, it excels in maintenance check nature.
[0016] It is desirable to join an abbreviation tabular fixing metal to one, to prepare for the both-sides side according to claim 2 by which said elastic body is arranged like in contact with said driving-side rib and said follower side rib, and to be fixed through a bolt in the periphery side of each fixing metal and the radial location to said driving-side rib and said follower side rib, respectively.
[0017] According to compression mold elastic-axis joint equipment according to claim 2, an elastic body is contacted through the fixing metal joined to one by vulcanization etc. to the driving-side rib and the follower side rib, respectively. And since it is fixed to each rib of both sides with the bolt in the periphery side of fixing metal, and the radial mid-position, even if an elastic body deteriorates Since a clearance is not generated in a joint with the fixing metal of an elastic body, a driving-side rib, and a follower side rib at the time of power transfer (especially torque fluctuation), it is prevented that the allophone accompanying generating of a clearance is not made, and fretting occurs between a driving-side rib and a follower side rib, and fixing metal. Furthermore, a torsion load rate can be easily changed by changing the thickness of fixing metal.
[0018] Both the flanges and ribs by the side of said driving side or said follower can really be connected with claim 3 pivotable by the cylinder-like covering member like a publication. [both / either or]

[0019] Since according to compression mold elastic-coupling equipment according to claim 3 a covering member acts as a reinforcing member and the assignment load of each rib is distributed,-izing of each rib can be carried out [small lightweight], and mass of the whole equipment can be made small.
[0020] Like the publication to claim 4, while making said elastic body face and preparing opening for cooling air in said one [at least] flange, it is good to penetrate and drill two or more paths for cooling air in said elastic body and said cylindrical covering member.
[0021] According to compression mold elastic-axis joint equipment according to claim 4, while air circulates and cools the circumference of an elastic body while in use (at the time of power transfer), air circulates the interior of an elastic body and an elastic body is cooled also from the interior. Consequently, the fatigue strength of an elastic body rises, the endurance of an elastic body improves, and it is stabilized for a long period of time, and becomes usable.
[0022] The body (the part except said fixing metal, i.e., elastic material) of said elastic body can become claim 5 from natural rubber, synthetic rubber, or elasticity resin like a publication.
[0023] With compression mold elastic-axis joint equipment according to claim 5, it is applicable to a wide range application.
[0024] Said elastic body can be interposed in one space section between said driving-side rib and said follower side rib, and a spring device can be made to be placed between the space sections of another side like the publication to claim 6.
[0025] Since a vessel does not immediately stop when the diesel power plant carried, for example in the vessel is stopped according to compression mold elastic-axis joint equipment according to claim 6, rotation is continued with inertial force, power tends to be transmitted to a driving shaft side from a follower shaft side, elastic-axis joint equipment tends to be reversed, a driveshaft tends to be pulled to an elastic body, and an operation tends to produce it. However, with an elastic body, since the spring device intervenes between the follower shaft side rib of the opposite side, and the driving shaft side rib, when a spring device resists that the gap of a follower shaft side rib and a driving shaft side rib changes (contraction), it is prevented that pull to an elastic body and the force acts.
[0026] The shock absorber (for example, an oleo damper and leaf spring equipment) according to claim 7 which has a damping function can constitute the part (three [for example,]) of said elastic bodies of plurality (six [for example,]) like.
[0027] According to compression mold elastic-axis joint equipment according to claim 7, attenuation improves further by the shock absorber having been built into the part for all compared with the case of only an elastic body.
[0028] The gap metering device which measures the amount of permanent deformation of the body (elastic material) of said elastic body can be arranged between the edge of said driving-side rib according to claim 8 which interposes said elastic body in one space section between said driving-side rib and said follower side rib like, and forms the space section of another side, and the edge of said follower side rib.
[0029] Since the gap between the ribs of another side is gradually expanded when according to compression mold elastic-coupling equipment according to claim 8 the elastic material which is the body of an elastic body ages and deteriorates and plastic deformation (contraction) has been carried out gradually, the amount of permanent deformation of elastic material is detectable by measuring the gap dimension with a metering device. Moreover, since an elastic body is arranged only at the side which transmits the power between a driving-side rib and a follower side rib, the mass of the whole equipment is mitigated. Furthermore, when an excessive hauling load occurs at the time of a halt of an engine and torsional-oscillation resonance point passage, for example at the time of starting of an engine, it can serve as the role of the stopper which holds a hauling load in the range which a joint does not damage.
[0030]
[Embodiment of the Invention] Hereafter, the gestalt of operation of the compression mold elastic-coupling equipment concerning this invention is explained based on a drawing.
[0031] The sectional view showing the example of the compression mold elastic-coupling equipment with which drawing 1 is interposed between the drive side shaft by the side of a Diesel engine and a follower side shaft, a front view, and drawing 2 are the B-B line sectional views of drawing 1 .

[0032] As shown in these drawings, the compression mold elastic-coupling equipment 1 of this example is interposed between the drive side shaft 51 and the follower side shaft 52. Outward flange 51a is formed in the edge of the drive side shaft 51 at one, and the circular ring-like driving-side flange 2 is really being fixed to this flange 51a by the circumferencial direction pivotable by two or more bolt 2a arranged at equal intervals. On the other hand, predetermined spacing is opened in shaft orientations and the follower side shaft 52 is arranged pivotable on the drive side shaft 51 and this mandril. It is inserted into central pore 3a of the outward minor diameter flange 3, and the edge of the follower side shaft 52 is really connected pivotable through the key 4. Inside the minor diameter flange 3 (drive side shaft 51 side), the follower side flange 5 of a major diameter is really connected with two or more bolts 6 pivotable around central pore 3a. The intake 7 of two or more cooling air is penetrated and drilled in a single string by the core approach of the large and small flange 3-5.
[0033] The driving-side rib 8 of the shape of a cross-section abbreviation triangle of plurality (this example five) protrudes on the circumferencial direction at equal intervals towards the follower side flange 5 from the driving-side flange 2. Moreover, the follower side rib 9 of the shape of a cross-section abbreviation triangle of plurality (this example five) protrudes on the circumferencial direction at equal intervals towards the driving-side flange 2 also from the follower side flange 5. The space section C which interposes an elastic body 10 in the opposite rib side which constitutes [the driving-side rib 8 and the follower side rib 9 **** are] each space section like drawing 1 , and the space section D which does not interpose an elastic body 10 are arranged on both sides of an axial center O at the symmetry. Moreover, the space section C is large and the space section D is set up quite narrowly.
[0034] Each elastic body 10 consists of fixing metal 12 of the pair arranged by carrying out phase opposite with the body (elastic material) 11 which consists of rectangular parallelepiped-like natural rubber in this example. Fixing metal 12 is abbreviation tabular, was refracted at the right angle and equips the periphery side with bolt attachment section 12a at one. moreover, radial [of fixing metal 12] -- mostly, it was made to project inside in the mid-position, and screwing section 12b of setscrew 13 point is prepared in it. And the body 11 is pasted up on the fixing metal 12 of a pair with vulcanization. In each space section C between the driving-side rib 8 and the follower side rib 9, an elastic body 10 is fitted in, and it screws in the peripheral face of each rib 8-9 with the bolt 14 which bolt attachment section 12a of fixing metal 12 penetrates, and is fixed. Moreover, in the center section by the side of each space section D (refer to drawing 2), hollow 8a and 9a are formed in the driving-side rib 8 and the follower side rib 9, respectively. In each hollow 8a and 9a, two or more drilling is carried out in the direction in which fixing metal 12 and the insertion hole 15 of a setscrew 13 cross at right angles, and a setscrew 13 is inserted in each insertion hole 15, and screwing section 12b is made to screw a point, and it is fixing to the inside of each rib 8-9 by binding tight.
[0035] In this example, as shown in drawing 1 , the hole 19 for gap metering devices is drilled by the periphery section approach of the narrow space sections D of the driving-side rib 8 and the follower side rib 9, and between the one space section D, and the gap metering device 25 is infixed in it at the hole 19 for gap measurement.
[0036] Moreover, two or more air ducts 21 for cooling open spacing in each body 11 of an elastic body, and are drilled in shaft orientations, and the metal sleeve 26 is fitted in into each air duct 21.
[0037] Between the peripheral faces of the adjoining driving-side rib 8, it is equipped by being screwed with the bolt 17 penetrated ranging over a circumferencial direction, respectively, and binding tight the cylindrical covering member 16 divided into the circumferencial direction the 5th grade. moreover, the circumferencial direction of each cylindrical covering member 16 -- mostly, the cooling air exhaust port 18 makes the air duct 21 for cooling of the body 11 of an elastic body attend, and opening is carried out to the mid-position. Furthermore, said gap metering device 25 is made to face, and opening of the gap measurement opening 20 is carried out to the cylindrical covering member 16.
[0038] Although the compression mold elastic-coupling equipment 1 applied to this example as mentioned above is constituted, the use mode of this equipment 1 is explained continuously.
[0039] In drawing 1 , when the Diesel engine as a driving gear starts operation, the driving-side rib 8 begins rotation to a counterclockwise rotation (the direction of an arrow head) with the driving-side flange 2. The body 11 of an elastic body 10 is compressed and the follower side shaft 52 rotates with

the follower side flange 3-5 by transmitting the turning effort from the driving-side rib 8 to the follower side rib 9.
[0040] In this condition, air flows within between flanges 2.5 from the air-intake 7 by the side of the follower of core approach, and when this air flows out of the cooling air exhaust port 18 of each cylindrical covering member 16 into a periphery side through the inside of the air duct 21 of each body 11 of an elastic body, each body 11 of an elastic body is always cooled during operation. For this reason, the fatigue strength of the body 11 of an elastic body is high, and it is hard to deteriorate. On the other hand, although the body 11 of an elastic body deteriorates in many years past and it is in the inclination which carries out contraction deformation The body 11 has pasted firmly the fixing metal 12 of the pair which counters a circumferencial direction with vulcanization. Moreover, since the periphery and radial pars intermedia side is being fixed with the bolt 14 and the setscrew 13 to the rib 8-9, respectively, a body 11 does not exfoliate from fixing metal 12, or each fixing metal 12 does not start fretting between the clamp faces of fixing metal 12 and each rib 8-9.
[0041] Furthermore, although the distance by the side of the space section D of a rib 8-9 spreads in connection with the distance by the side of the space section C of a rib 8-9 narrowing according to the contraction phenomenon accompanying degradation of the body 11 of an elastic body, this is measured by the gap metering device 25, and can check the degree of the gap between ribs 8.9 visually also by showing from the gap measurement opening 20.
[0042] Next, drawing 3 and drawing 4 show other examples, and drawing 3 is a fragmentary sectional view corresponding to [in drawing 4 R> 4] drawing 2 for the fragmentary sectional view corresponding to drawing 1 again. In compression mold elastic-coupling equipment 1' of this example, to the driving-side rib 8 by the side of the space section D, and the follower side rib 9, on both sides of hollow 8a and 9a, the abbreviation U-like crevice 22 for spring loading is formed in both sides like drawing 4 , respectively, and the coil spring 23 is ****(ed) ranging over between the crevices 22 for spring loading which carry out phase opposite like drawing 3 . Since it is common in the above-mentioned example about other configurations, it is shown in a common member using the same sign, and explanation is omitted.
[0043] At compression mold elastic-coupling equipment 1' of this example, by having interposed the coil spring 23 in the space section D of the driving-side rib 8 and the follower side rib 9, an elastic body 10 or a coil spring 23 is interposed in all the space sections between ribs 8.9, it is hard coming to displace the distance between ribs 8.9, and it is stabilized. When operation of the Diesel engine which carried in the vessel especially is suspended, in order that a vessel may not stop immediately, a driveshaft continues rotation with inertial force. Although it reverses clockwise (the arrow head and opposite direction of drawing 3), and elastic-axis joint equipment 1' changes to the body 11 of an elastic body at a compression operation, and pulls [power is transmitted to the drive side shaft 51 from the follower side shaft 52] and an operation arises Since the coil spring 23 is interposed in the space section D of the follower shaft side rib 9 of the opposite side, and the driving shaft side rib 8 in the elastic body 10 Since it resists that it is going to shorten the gap of the follower shaft side rib 9 and the driving shaft side rib 8 by compressing this coil spring 23, it is prevented that the body 11 of an elastic body is pulled, and the endurance of a body 11 improves.
[0044] Drawing 5 is some sectional views showing still more nearly another example of compression mold elastic-coupling equipment. In compression mold elastic-coupling equipment 1" of this example, the number of groups of the driving-side rib 8 and the follower side rib 9 is increased, it considers as 6 sets, an elastic body 10 is alternately interposed in the three space sections C among the six space sections C between ribs 8.9, and the oleo damper 24 or leaf spring equipment (not shown) which is a shock absorber which has a damping function in the remaining space section C is interposed. Since it is common in the above-mentioned example about other configurations, it is shown in a common member using the same sign, and explanation is omitted.
[0045] Since attenuation improves further by having incorporated the oleo damper 24 in which all have a damper function an elastic body 10 and by turns compared with the case of only an elastic body 10 in compression mold elastic-axis joint equipment 1" of this example, a Diesel engine's torque fluctuation is absorbed smoothly and power is transmitted to the follower side shaft 52 from the drive side shaft 51.
[0046] Although three examples were shown about the compression mold elastic-coupling

equipment of this invention above, this invention can also be carried out as follows.
[0047] ** The covering member 16 of the shape of a cylinder which has connected driving-side rib 8 comrades can be excluded, consequently structure is simplified, and the cooling effect of an elastic body increases. Moreover, it may replace with the driving-side rib 8, and follower side rib 9 comrades may be connected, or the driving-side flange 2 and the driving-side rib 8 may be connected.
[0048] ** The body 11 of an elastic body (elastic material) may be synthetic rubber, or may be elasticity resin.
[0049] ** It is applicable to transmissions, such as not only the Diesel engine for a propeller drive for vessels but a generator, and a construction equipment.
[0050] ** Screwing section 12b prepared in fixing metal can serve as a role of a stopper so that an excessive compressive load may not act on an elastic body 10.
[0051]
[Effect of the Invention] There is the following outstanding effectiveness in the compression mold elastic-coupling equipment concerning this invention so that clearly from having explained above.
[0052] (1) Since the elastic body between a driving side and a follower side flange can be drawn out and exchanged for radial at the time of the exchange at the time of an elastic body (elastic material) deteriorating etc., it is not necessary to move a driving-side machine and a follower side machine, and exchange is easy and possible for a short time. And since the conditions (the loaded condition under operation, extent of degradation, etc.) of an elastic body can be visually checked from the periphery side between a driving-side flange and a follower side flange, it excels in maintenance maintainability, in that the loaded condition under operation of an elastic body can be grasped easily and the exchange stage of an elastic body can be easily grasped from a degradation condition etc.
[0053] (2) According to equipment according to claim 2, contact an elastic body through the fixing metal joined to one by vulcanization etc. to the rib, respectively. And since it is fixing to each rib of both sides with the bolt in the periphery side of fixing metal, and the radial mid-position, even if an elastic body deteriorates and contracts At the time of power transfer (especially torque fluctuation), a clearance cannot be generated in a joint with fixing metal, the allophone accompanying generating of a clearance is not made, and generating of fretting between a rib and fixing metal can be prevented.
[0054] Furthermore, a torsion load rate can be easily changed by what the thickness of fixing metal is changed for (** which does not change the class of elastic material).
[0055] (3) With equipment according to claim 3, since a covering member acts as a reinforcing member and the assignment load of each rib is distributed,-izing of each rib can be carried out [small lightweight], and the mass of the whole equipment can be mitigated.
[0056] (4) Since air can be circulated also inside an elastic body and an elastic body can be cooled from the interior while circulating air while in use around an elastic body (at the time of power transfer), the fatigue strength of an elastic body raises equipment according to claim 4, its endurance of an elastic body improves, and it can be used for it, being stabilized for a long period of time.
[0057] (5) Equipment according to claim 5 is applicable to a wide range application by changing the class of elastic material.
[0058] (6) With an elastic body, when the Diesel engine which carried in the vessel is suspended, even if power tends to be transmitted to a driving shaft side from a follower shaft side with inertial force, equipment tends to be reversed, it is going to pull to an elastic body and an operation tends to arise, since the spring device made to intervene between the ribs of the opposite side resists that the gap between ribs narrows, it is prevented that an elastic body is pulled, therefore endurance of according to claim 6 equipment improves.
[0059] (7) Attenuation of according to claim 7 equipment improves further by the shock absorber in which all have a damping function compared with the case of only an elastic body having been built into the part, and power is smoothly transmitted also at the time of torque fluctuation.
[0060] (8) With equipment according to claim 8, when plastic deformation (contraction) is carried out by deteriorating, for example while the elastic material which is a body of an elastic body used it, since the gap between the ribs of another side is expanded, the amount of permanent deformation of elastic material can be detected by measuring the gap dimension with a metering device.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The left half which shows the example of the compression mold elastic-coupling equipment of this invention interposed between the drive side shaft by the side of a Diesel engine and a follower side shaft is a sectional view, and a right half is a front view.
[Drawing 2] It is the B-B line sectional view of drawing 1 .
[Drawing 3] It is the fragmentary sectional view corresponding to drawing 1 showing some compression mold elastic-coupling equipments concerning other examples of this invention.
[Drawing 4] It is the fragmentary sectional view corresponding to drawing 2 showing some compression mold elastic-coupling equipments concerning other examples of this invention.
[Drawing 5] It is the fragmentary sectional view showing some compression mold elastic-coupling equipments concerning the example of further others of this invention.
[Description of Notations]
1, 1', and 1" compression mold elastic-coupling equipment
2 Driving-Side Flange
3 Flange
4 Key
5 Follower Side Flange
6-14-17 Bolt
7 Intake for Cooling Air (Opening for Cooling Air)
8 Driving-Side Rib
9 Follower Side Rib
10 Elastic Body
11 Body (Elastic Material)
12 Fixing Metal
13 Setscrew
15 Insertion Hole
16 Cylindrical Covering Member
18 Air Exhaust Port
19 Hole for Gap Measurement
20 Gap Measurement Opening
21 Air Duct for Cooling (Path for Cooling Air)
22 Crevice for Spring Loading
23 Coil Spring
24 Oleo Damper
25 Gap Metering Device
26 Sleeve
51 Drive Side Shaft
52 Follower Side Shaft
C-D Space section

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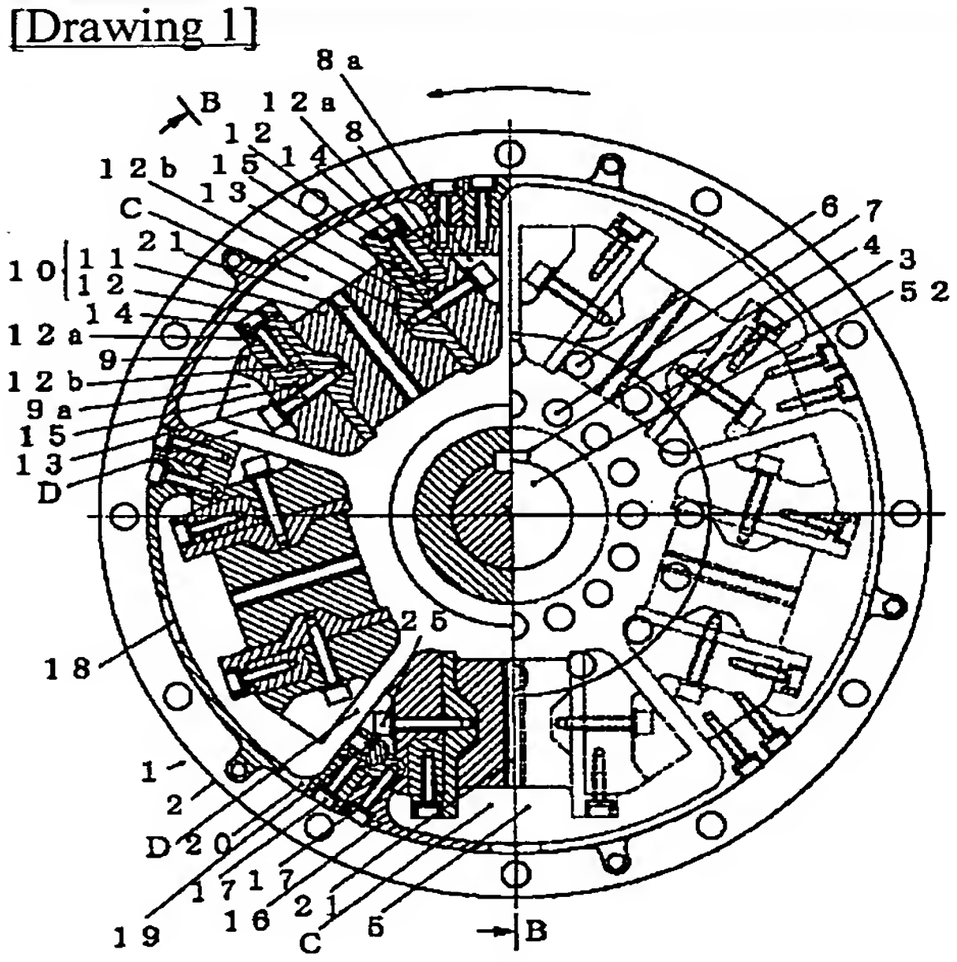
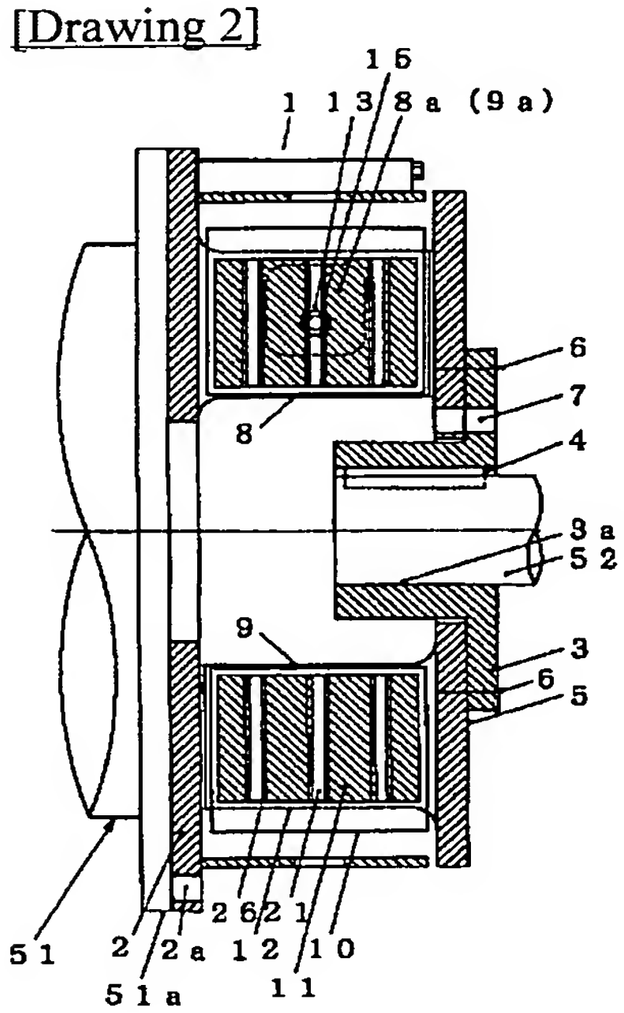
DRAWINGS

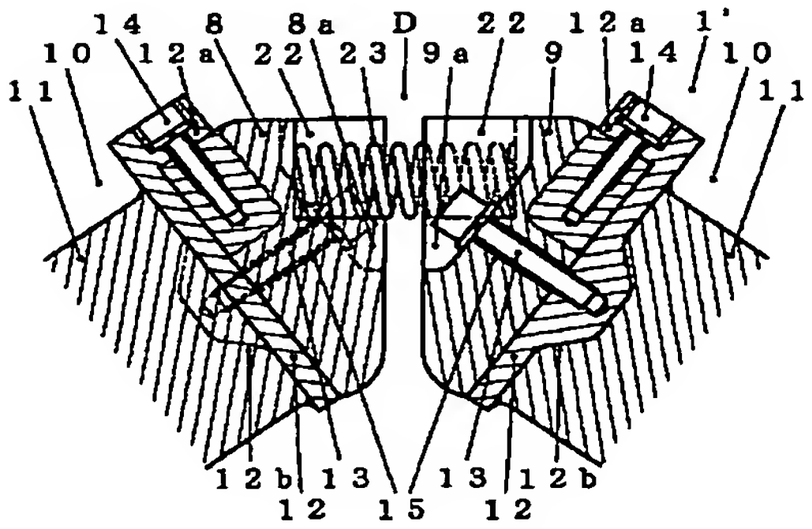
[Drawing 1]



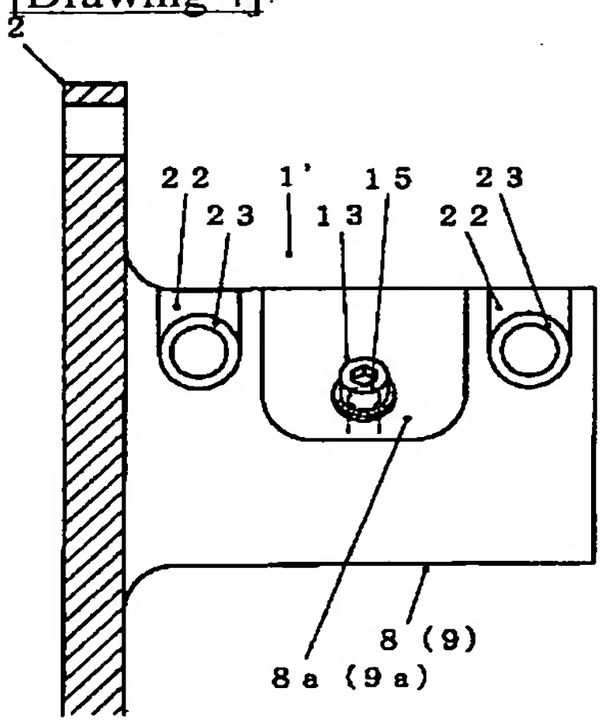
[Drawing 2]



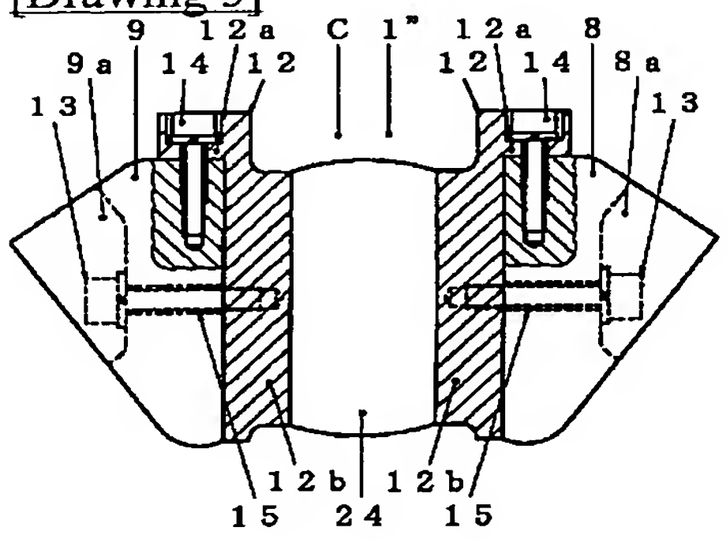
[Drawing 3]



[Drawing 4]



[Drawing 5]



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PATENT ABSTRACTS OF JAPAN

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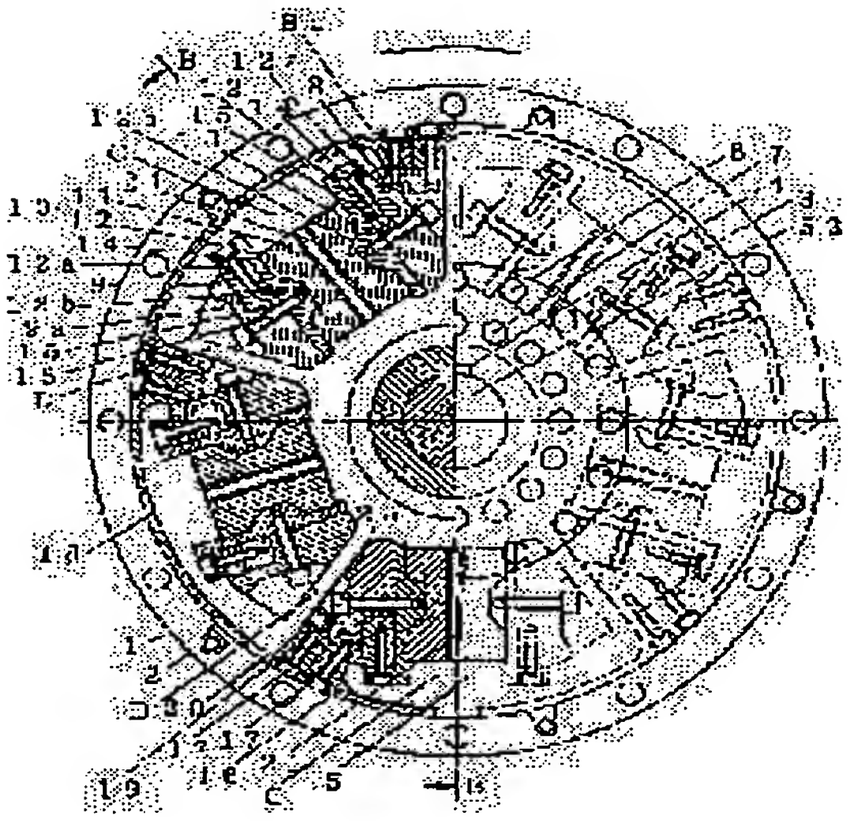
(71)Applicant : KAWASAKI HEAVY IND LTD
(72)Inventor : KASHIMOTO SUSUMU

(54) COMPRESSION TYPE ELASTIC JOINT UNIT

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a compression type elastic joint unit in which generation of play owing to aging is prevented, fretting of a joint surface in an elastic body is restrained, durability is improved, mass of the whole of the unit is reduced, no mechanical equipment need not be transferred when the elastic body is replaced to thereby make its replacement easy, thus allowing excellent maintenability.



SOLUTION: A driving shaft 51 end and a driven shaft 52 end are coaxially spaced at predetermined intervals in an axial direction and a plurality of driving side ribs 8 are spaced uniformly in a circumferential direction of a driving side flange 2 that is provided integrally and rotatably with the driving shaft 51 end and in a protruding manner to a driven shaft side. Besides, a plurality of driven side ribs 9 are spaced uniformly in a circumferential direction of a driven side flange 5 that is provided integrally and rotatably with the driven shaft 52 end so as not to interfere with each of the driving side ribs 8 and in a protruding manner to a driving shaft side. The elastic body 10 for drive train is inserted, in a radial direction from outer peripheral sides of both flanges 2 and 5 to the center of the shafts, into a space C between the driving side ribs 8 and the driven side ribs 9 that both correspond to each other, resulting in lying therebetween.

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3/12			3/12	Ａ

審査請求　有　　請求項の数８　　ＯＬ　（全７頁）

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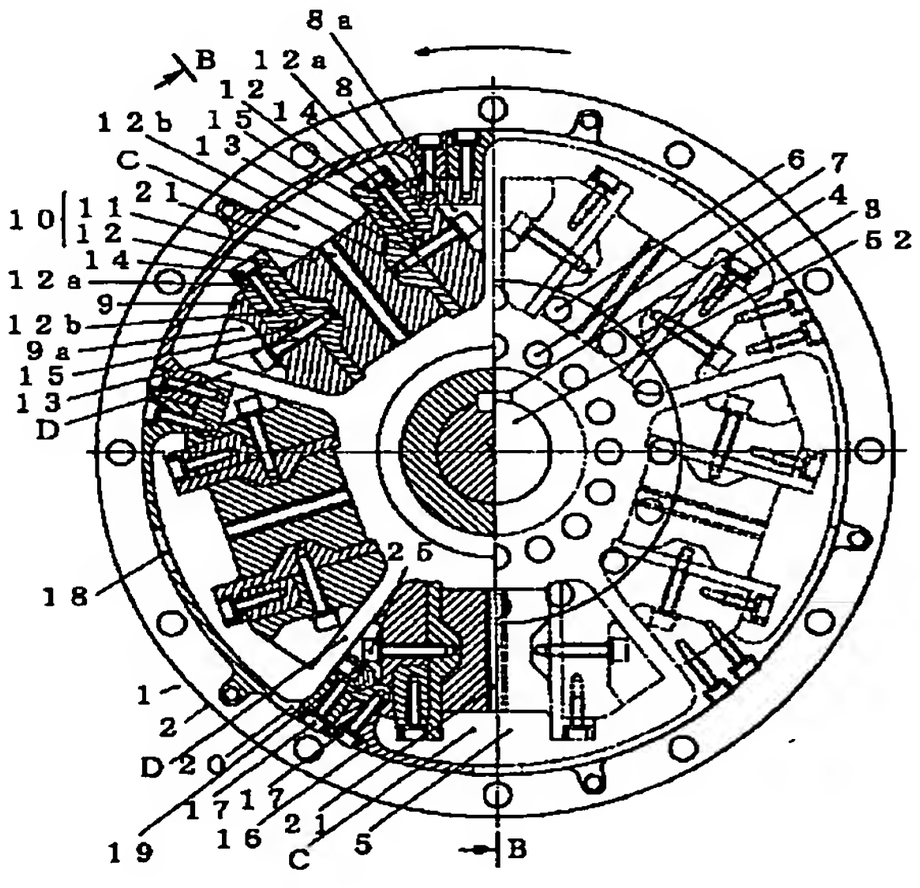
(54)【発明の名称】　圧縮型弾性継手装置

(57)【要約】　（修正有）
【課題】　弾性体の老化によるガタの発生を防止し、弾性体の接合面のフレッチングを防止し、耐久性が向上され、装置全体の質量を小さくし、弾性体の交換時に機械設備の移動が不要で、交換が容易になって保守整備性に優れた圧縮型弾性継手装置を提供する。
【解決手段】　駆動軸５１端と従動軸５２端とを軸方向に所定間隔をあけて同心軸上に配置し、駆動軸５１端に一体回転可能に設けた駆動側フランジ２の円周方向に等間隔に複数の駆動側リブ８を従動軸側へ突設するとともに、従動軸５２端に一体回転可能に設けた従動側フランジ５　との周方向に等間隔にかつ各駆動側リブ８と干渉しないように複数の従動側リブ９を駆動軸側へ突設し、対応する駆動側リブ８と従動側リブ９との空間部Ｃに、動力伝達用の弾性体１０を両フランジ２・５の外周側から軸芯に向け半径方向に嵌挿して介設している。



【特許請求の範囲】

【請求項１】　駆動軸端と従動軸端とを軸方向に所定間隔をあけて同心軸上に配置し、
前記駆動軸端に一体回転可能に設けた駆動側フランジの円周方向に等間隔に複数の駆動側リブを従動軸側へ突設するとともに、前記従動軸端に一体回転可能に設けた従動側フランジの円周方向に等間隔にかつ前記各駆動側リブと干渉しないように複数の従動側リブを駆動軸側へ突設し、
対応する前記駆動側リブと前記従動側リブとの空間部に、動力伝達用の弾性体を前記両フランジの外周側から軸芯に向け半径方向に嵌挿して介設したことを特徴とする圧縮型弾性軸継手装置。

【請求項２】　前記弾性体は、前記駆動側リブおよび前記従動側リブに当接して配置される両側面に略板状の取付金具を一体に接合して備え、各取付金具の外周側および半径方向位置で前記駆動側リブおよび前記従動側リブに対しそれぞれボルトを介して固定されていることを特徴とする請求項１記載の圧縮型弾性軸継手装置。

【請求項３】　前記駆動側もしくは前記従動側の、フランジおよびリブのいずれか又は両方を円筒状のカバー部材により一体回転可能に連結したことを特徴とする請求項１又は２記載の圧縮型弾性軸継手装置。

【請求項４】　前記弾性体に臨ませて少なくとも一方の前記フランジに冷却空気用開口を設けるとともに、前記弾性体および前記円筒状カバー部材に複数の冷却空気用通路を貫通して穿設したことを特徴とする請求項３記載の圧縮型弾性軸継手装置。

【請求項５】　前記弾性体の本体（前記取付金具を除く部分）が、天然ゴム、合成ゴム又は軟質樹脂からなることを特徴とする請求項１～４のいずれか記載の圧縮型弾性軸継手装置。

【請求項６】　前記駆動側リブと前記従動側リブ間の一方の空間部に前記弾性体を介設し、他方の空間部にバネ機構を介在させたことを特徴とする請求項１～５のいずれか記載の圧縮型弾性軸継手装置。

【請求項７】　複数の前記弾性体のうちの一部を、ダンピング機能を有する緩衝装置により構成したことを特徴とする請求項１～６のいずれか記載の圧縮型弾性軸継手装置。

【請求項８】　前記駆動側リブと前記従動側リブ間の一方の空間部に前記弾性体を介設し、他方の空間部を形成する前記駆動側リブと前記従動側リブとの間に跨って前記弾性体の本体の永久変形量を計測する間隙計測装置を配備したことを特徴とする請求項１～７のいずれか記載の圧縮型弾性軸継手装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】この発明は、たとえばディーゼルエンジンのような変動する駆動力を弾性体により減

衰させるための弾性継手装置に関するもので、詳しくは、入出力軸間に介設した弾性体を圧縮する方向へ変形させながら動力を伝達する、圧縮型弾性軸継手装置に関するものである。

【０００２】

【従来の技術】この種の圧縮型弾性継手装置に関する先行技術に、たとえば特開平７－２７１４２号公報に記載の装置Ａがある。この装置Ａは、二段ねじり弾性継手で、中心部寄りにねじり剛性の低い弾性体が配置され、外周部寄りにねじり剛性の高い弾性体が配置されている。そして、低トルクのときには駆動側フランジから中心部寄りの弾性体を介して従動側へ動力が伝達され、負荷が大きくなると中心部寄りの弾性体とともに外周側の弾性体を介して従動側へ動力が伝達される構造からなる。

【０００３】その他の先行技術に、ドイツ国特許２６２４５００号明細書および図面に記載の装置Ｂ、ドイツ国特許２９７１６１６５号明細書および図面に記載の装置Ｃならびにドイツ国特許３４３２４３６号明細書および図面に記載の装置Ｄがある。

【０００４】

【発明が解決しようとする課題】しかしながら上記した各公報等に記載の装置イ～ニには、それぞれ以下の点で改良すべき余地がある。すなわち、

①　装置イ：中心部寄りおよび外周部寄りのいずれの弾性体も固定されていないために、弾性体が経年的に老化して塑性変形により収縮し、入力軸間と出力軸間に、ガタ（隙間）が生じやすい。

【０００５】弾性体は駆動側と従動側との間隙内に、軸方向に配置されているため、弾性体の組み込み時や交換時に、駆動側と従動側の機械設備を相対的に軸方向に移動する、又は大きな開放スペースを確保する必要があり、点検に手間がかかり、保守整備性が悪い。

【０００６】弾性体を冷却する機構が施されておらず、したがって疲労強度が低い。

【０００７】②　装置ロ・ハ：入出力軸（駆動軸・従動軸）間に介設された弾性体が機械的に固定されていないため、弾性体が経年的に老化して塑性変形により収縮し、入力軸と出力軸間にガタが生じたり、ガタ発生に伴って異音が発生したり、入力軸側から出力軸側へ衝撃荷重を与えたりするおそれがある。

【０００８】装置全体の質量が大きい。

【０００９】弾性体の老化状態を簡単にはチェックできない。また、弾性体は入出力軸間の軸方向に配置されるために、弾性体の交換の際に入出力軸の機械設備を相対的に軸方向に大きく移動する、又は大きな開放スペースを確保する必要があり、点検に時間がかかり、保守整備性が悪い。

【００１０】弾性体にその冷却機構が施されておらず、疲労強度が低い。

【００１１】㉓　装置ニ：入出力軸間における弾性体の配置方向についてはとくに記載されていないが、図面から判断して構造的に軸方向に配置されている。このため、上記の各装置イ～ハと同様に、弾性体の交換の際に入出力軸の機械設備を相対的に軸方向に大きく移動させて、大きな開放スペースを確保する必要があり、点検に時間がかかり、保守整備性が悪い。

【００１２】弾性体にその冷却機構が施されておらず、疲労強度が低い。

【００１３】この発明は上記した従来（公報記載を含む）の弾性継手装置における不具合を解決するもので、１．弾性体の老化によるガタの発生およびそれによる異音の発生を防止する、入出力軸と弾性体の金具との接合面のフレッチングを防止する、弾性体の疲労強度を高める、継手のダンピング効果の調整を容易にする ― ことにより耐久性が向上され、２．装置全体の質量を小さくする、弾性体の交換時に機械設備の移動が不要で、交換が容易になる、弾性体の老化状態を簡単に把握できる ― ことによって保守整備性に優れた、圧縮型弾性継手装置を提供することを目的としている。

【００１４】

【課題を解決するための手段】上記の目的を達成するためにこの発明にかかる圧縮型弾性継手装置は、駆動軸端と従動軸端とを軸方向に所定間隔をあけて同心軸上に配置し、前記駆動軸端に一体回転可能に設けた駆動側フランジの円周方向に等間隔に複数の駆動側リブを従動軸側へ突設するとともに、前記従動軸端に一体回転可能に設けた従動側フランジの円周方向に等間隔にかつ前記各駆動側リブと干渉しないように複数の従動側リブを駆動軸側へ突設し、対応する前記駆動側リブと前記従動側リブとの空間部に、動力伝達用の弾性体を前記両フランジの外周側から軸芯に向け半径方向に嵌挿して介設したことを特徴としている。

【００１５】上記の構成を有する本発明の圧縮型弾性軸継手装置によれば、駆動側リブと従動側リブ間の空間部に介設される各弾性体を外周側から軸芯に向けて嵌挿しているので、たとえば弾性体が劣化した際の交換時には、弾性体を半径方向に引き抜いて交換できるので、駆動側機械設備および従動側機械設備を移動させる必要がなく、交換が容易で短時間にできる。しかも、駆動側フランジと従動側フランジの間の外周側から弾性体の状態（運転中の負荷状態や老化の程度など）を目視で確認することにより、弾性体の交換時期などを簡単に把握できるから、保守点検性に優れている。

【００１６】請求項２に記載のように、前記弾性体は、前記駆動側リブおよび前記従動側リブに当接して配置される両側面に略板状の取付金具を一体に接合して備え、各取付金具の外周側および半径方向位置で前記駆動側リブおよび前記従動側リブに対しそれぞれボルトを介して固定されていることが望ましい。

【００１７】請求項２記載の圧縮型弾性軸継手装置によれば、弾性体は駆動側リブおよび従動側リブに対しそれぞれ加硫等により一体に接合された取付金具を介して当接され、しかも両側の各リブに取付金具の外周側および半径方向の中間位置でボルトにより固定されているから、弾性体が劣化しても、動力伝達（とくにトルク変動）時に弾性体の取付金具と駆動側リブおよび従動側リブとの接合部に隙間が生じないため、隙間の発生に伴う異音が生じたりせず、また駆動側リブおよび従動側リブと取付金具間にフレッチングが発生したりするのが防止される。さらに、取付金具の厚みを変更することによって、ねじりバネ定数を容易に変更できる。

【００１８】請求項３に記載のように、前記駆動側もしくは前記従動側の、フランジおよびリブのいずれか又は両方を円筒状のカバー部材により一体回転可能に連結することができる。

【００１９】請求項３記載の圧縮型弾性継手装置によれば、カバー部材が補強メンバーとして作用し、各リブの分担荷重が分散されるので、各リブを小形軽量化でき、装置全体の質量を小さくできる。

【００２０】請求項４に記載のように、前記弾性体に臨ませて少なくとも一方の前記フランジに冷却空気用開口を設けるとともに、前記弾性体および前記円筒状カバー部材に複数の冷却空気用通路を貫通して穿設するとよい。

【００２１】請求項４記載の圧縮型弾性軸継手装置によれば、使用中（動力伝達時）に弾性体の周辺を空気が流通して冷却するとともに、弾性体の内部を空気が流通して内部からも弾性体を冷却する。この結果、弾性体の疲労強度がアップし、弾性体の耐久性が向上し、長期間安定して使用可能になる。

【００２２】請求項５に記載のように、前記弾性体の本体（前記取付金具を除く部分、つまり弾性材）が、天然ゴム、合成ゴム又は軟質樹脂からなることができる。

【００２３】請求項５記載の圧縮型弾性軸継手装置では、広範囲の用途に適用可能である。

【００２４】請求項６に記載のように、前記駆動側リブと前記従動側リブ間の一方の空間部に前記弾性体を介設し、他方の空間部にバネ機構を介在させることができる。

【００２５】請求項６記載の圧縮型弾性軸継手装置によれば、たとえば船舶に搭載したディーゼルエンジンを停止した場合、船舶はすぐには停止しないため、プロペラシャフトは慣性力により回転を継続し、従動軸側から駆動軸側に動力が伝達され、弾性軸継手装置が逆転し、弾性体に引っ張り作用が生じようとする。しかし、弾性体とは反対側の従動軸側リブと駆動軸側リブとの間にバネ機構が介在されているので、バネ機構が従動軸側リブと駆動軸側リブとの間隙が変化（縮小）するのに抗することによって弾性体に引っ張り力が作用するのが阻止され

る。

【００２６】請求項７に記載のように、複数（たとえば６つ）の前記弾性体のうちの一部（たとえば３つ）を、ダンピング機能を有する緩衝装置（たとえば油圧ダンパーや重ね板バネ装置）により構成することができる。

【００２７】請求項７記載の圧縮型弾性軸継手装置によれば、全てが弾性体だけの場合に比べて、緩衝装置が一部に組み込まれたことで減衰作用が一層向上される。

【００２８】請求項８に記載のように、前記駆動側リブと前記従動側リブ間の一方の空間部に前記弾性体を介設し、他方の空間部を形成する前記駆動側リブの端部と前記従動側リブの端部との間に前記弾性体の本体（弾性材）の永久変形量を計測する間隙計測装置を配備することができる。

【００２９】請求項８記載の圧縮型弾性継手装置によれば、弾性体の本体である弾性材が経年変化して劣化することにより徐々に塑性変形（収縮）してきたときに、他方のリブ間の間隙が徐々に拡大することから、その間隙寸法を計測装置で計測することによって弾性材の永久変形量を検知できる。また、弾性体を駆動側リブと従動側リブ間の動力を伝達する側にのみ配備することから、装置全体の質量が軽減される。さらに、たとえば機関の起動時、機関の停止時およびねじり振動共振点通過時に、過大な引っ張り荷重が発生した場合、引っ張り荷重を継手が損傷しない範囲に保持するストッパーの役割を兼ねることができる。

【００３０】

【発明の実施の形態】以下、この発明にかかる圧縮型弾性継手装置の実施の形態を図面に基づいて説明する。

【００３１】図１はディーゼル機関側の駆動側軸と従動側軸との間に介設される圧縮型弾性継手装置の実施例を示す断面図と正面図、図２は図１のＢ－Ｂ線断面図である。

【００３２】これらの図面に示すように、本例の圧縮型弾性継手装置１は駆動側軸５１と従動側軸５２との間に介設されている。駆動側軸５１の端部には外向きのフランジ５１ａが一体に形成され、このフランジ５１ａに円環状の駆動側フランジ２が円周方向に等間隔に配置される複数本のボルト２ａにより一体回転可能に固定されている。一方、軸方向に所定間隔をあけて従動側軸５２が、駆動側軸５１と同心軸上に回転可能に配置されている。従動側軸５２の端部は外向きの小径フランジ３の中央孔部３ａ内に緩挿され、キー４を介して一体回転可能に連結されている。中央孔部３ａの周囲で小径フランジ３の内側（駆動側軸５１側）に、大径の従動側フランジ５が一体回転可能に複数本のボルト６で連結されている。大小のフランジ３・５の中心部寄りには、複数の冷却空気の取入口７が一連に貫通して穿設されている。

【００３３】駆動側フランジ２から従動側フランジ５に向けて複数（本例では５つ）の断面略三角形状の駆動側リブ８が、円周方向に等間隔に突設されている。また、従動側フランジ５からも駆動側フランジ２に向けて複数（本例では５つ）の断面略三角形状の従動側リブ９が、円周方向に等間隔に突設されている。駆動側リブ８と従動側リブ９とは、図１のように各空間部を構成する対向リブ面に、弾性体１０を介設する空間部Ｃと弾性体１０を介設しない空間部Ｄとが軸心Ｏを挟んで対称に配置される。また空間部Ｃは広く、空間部Ｄはかなり狭く設定されている。

【００３４】各弾性体１０は、本例では直方体状の天然ゴムからなる本体（弾性材）１１と相対向して配置される一対の取付金具１２とからなる。取付金具１２は略板状で、外周側にボルト取付部１２ａを直角に屈折して一体に備えている。また取付金具１２の半径方向のほぼ中間位置には、止めねじ１３先端部の螺合部１２ｂを内側に突出させて設けている。そして、本体１１は一対の取付金具１２に加硫により接着されている。駆動側リブ８と従動側リブ９間の各空間部Ｃ内に、弾性体１０が嵌挿され、取付金具１２のボルト取付部１２ａが貫通するボルト１４により各リブ８・９の外周面に螺合して固定されている。また、駆動側リブ８と従動側リブ９には、各空間部Ｄ側の中央部（図２参照）において凹所８ａ・９ａがそれぞれ形成され、各凹所８ａ・９ａ内に止めねじ１３の挿通孔１５が取付金具１２に直交する方向に複数穿設されており、各挿通孔１５に止めねじ１３を挿通して先端部を螺合部１２ｂに螺合させ、締め付けることにより各リブ８・９の内面に固定している。

【００３５】本例の場合、図１に示すように、駆動側リブ８と従動側リブ９との狭い空間部Ｄのうちの一つの空間部Ｄ間の外周部寄りに、間隙計測装置用孔１９が穿設され、間隙計測用孔１９に間隙計測装置２５が介装されている。

【００３６】また、各弾性体本体１１には、複数の冷却用空気通路２１が軸方向に間隔をあけて穿設され、各空気通路２１内に金属製スリーブ２６が嵌挿されている。

【００３７】隣接する駆動側リブ８の外周面間には、円周方向に５等分割した円筒状カバー部材１６をそれぞれ円周方向に跨って貫通するボルト１７により螺合され、締め付けることにより装着されている。また、各円筒状カバー部材１６の円周方向のほぼ中間位置に、冷却空気排出口１８が弾性体本体１１の冷却用空気通路２１に臨ませて開口されている。さらに、前記間隙計測装置２５に臨ませて円筒状カバー部材１６に間隙計測口２０が開口されている。

【００３８】以上のようにして、本実施例にかかる圧縮型弾性継手装置１が構成されるが、続いて本装置１の使用態様について説明する。

【００３９】図１において、駆動装置としてのディーゼル機関が運転を開始することによって、駆動側リブ８が駆動側フランジ２とともに反時計方向（矢印の方向）へ

回転を始める。弾性体１０の本体１１が圧縮され、駆動側リブ８からの回転力が従動側リブ９へ伝達されることにより、従動側フランジ３・５とともに従動側軸５２が回転する。

【００４０】この状態で、中心部寄りの従動側の空気取入口７からフランジ２・５間内に空気が流入し、この空気は各弾性体本体１１の空気通路２１内を通って各円筒状カバー部材１６の冷却空気排出口１８から外周側へ流出することにより、運転中は各弾性体本体１１が常に冷却される。このため、弾性体本体１１の疲労強度が高く、劣化しにくい。一方、弾性体本体１１は、経年的に劣化していき、収縮変形する傾向にあるが、円周方向に対向する一対の取付金具１２に本体１１が加硫にてしっかりと接着されており、また各取付金具１２はリブ８・９に対してボルト１４と止めねじ１３にて外周側と半径方向中間部側とがそれぞれ固定されているので、本体１１が取付金具１２から剥離したり取付金具１２と各リブ８・９の取付面間でフレッチングを起こしたりしない。

【００４１】さらに、弾性体本体１１の劣化に伴う収縮現象によってリブ８・９の空間部Ｃ側の距離が狭まるのに伴って、リブ８・９の空間部Ｄ側の距離が拡がるが、これは間隙計測装置２５によって計測され、間隙計測口２０から覗くことによってもリブ８・９間の間隙の度合いを目視にて確認できる。

【００４２】つぎに、図３および図４は他の実施例を示すもので、図３は図１に対応する部分断面図を、また図４は図２に対応する部分断面図である。本実施例の圧縮型弾性継手装置１’では、空間部Ｄ側の駆動側リブ８と従動側リブ９とに、凹所８ａ・９ａを挟んで両側に図４のように略Ｕ状のバネ装填用凹部２２をそれぞれ形成し、図３のように相対向するバネ装填用凹部２２間に跨ってコイルバネ２３を縮装している。その他の構成については上記実施例と共通するので、共通の部材には同一の符号を用いて示し、説明を省略する。

【００４３】本実施例の圧縮型弾性継手装置１’では、駆動側リブ８と従動側リブ９との空間部Ｄにコイルバネ２３を介設したことで、リブ８・９間の全ての空間部に弾性体１０あるいはコイルバネ２３が介設され、リブ８・９間の距離が変位しにくくなって安定する。とくに、船舶に搭載したディーゼル機関の運転を停止した場合に、船舶はすぐに停止しないためにプロペラシャフトが慣性力により回転を継続し、従動側軸５２から駆動側軸５１に動力が伝達され、弾性軸継手装置１’が時計方向（図３の矢印と反対方向）に逆転し、弾性体本体１１には圧縮作用に変わって引っ張り作用が生じるが、弾性体１０とは反対側の従動軸側リブ９と駆動軸側リブ８との空間部Ｄにコイルバネ２３が介設されているので、このコイルバネ２３が圧縮されることによって従動軸側リブ９と駆動軸側リブ８との間隙が縮まろうとするのに抗するので、弾性体本体１１が引っ張られるのが防止され、本体１１の耐久性が向上する。

【００４４】図５は圧縮型弾性継手装置のさらに別の実施例を示す一部の断面図である。本実施例の圧縮型弾性継手装置１”では、駆動側リブ８と従動側リブ９の組数を増やして６組とし、リブ８・９間の６つの空間部Ｃのうち、３つの空間部Ｃに１つおきに弾性体１０を介設し、残りの空間部Ｃにダンピング機能を有する緩衝装置である油圧ダンパー２４あるいは重ね板バネ装置（図示せず）を介設している。その他の構成については上記実施例と共通するので、共通の部材には同一の符号を用いて示し、説明を省略する。

【００４５】本実施例の圧縮型弾性軸継手装置１”の場合、全てが弾性体１０だけの場合に比べて、弾性体１０と交互にダンパー機能を有する油圧ダンパー２４を組み込んだことによって減衰作用が一層向上されるので、ディーゼル機関のトルク変動がスムーズに吸収され、駆動側軸５１から従動側軸５２へ動力が伝達される。

【００４６】上記に本発明の圧縮型弾性継手装置について三つの実施例を示したが、本発明は下記のように実施することもできる。

【００４７】①　駆動側リブ８同士を連結している円筒状のカバー部材１６を省くことができ、この結果、構造が簡略化され、弾性体の冷却効果が高まる。また、駆動側リブ８に代えて従動側リブ９同士を連結してもよく、あるいは駆動側フランジ２と駆動側リブ８とを連結してもよい。

【００４８】②　弾性体本体（弾性材）１１は、合成ゴムであってもよく、あるいは軟質樹脂であってもよい。

【００４９】③　船舶用のプロペラ駆動用ディーゼル機関に限らず、発電機や建設機械などの動力伝達装置に適用できる。

【００５０】④　取付金具に設けられた螺合部１２ｂは、弾性体１０に過大な圧縮荷重が作用しないように、ストッパとしての役割を兼ねることができる。

【００５１】

【発明の効果】以上説明したことから明らかなように、本発明にかかる圧縮型弾性継手装置には、つぎのような優れた効果がある。

【００５２】(1) 弾性体（弾性材）が劣化した際などの交換時には、駆動側および従動側フランジ間の弾性体を半径方向に引き抜いて交換できるので、駆動側機械設備および従動側機械設備を移動させる必要がなく、交換が容易で短時間にできる。しかも、駆動側フランジと従動側フランジの間の外周側から弾性体の状態（運転中の負荷状態や劣化の程度など）を目視で確認できるので、弾性体の運転中の負荷状態を容易に把握でき、また劣化状態などから弾性体の交換時期を簡単に把握できるなど、保守整備性に優れている。

【００５３】(2) 請求項２記載の装置によれば、弾性体をリブに対しそれぞれ加硫等により一体に接合された取

付金具を介して当接し、しかも両側の各リブに取付金具の外周側および半径方向の中間位置でボルトにより固定しているから、弾性体が劣化・収縮しても、動力伝達（とくにトルク変動）時に取付金具との接合部に隙間が生じたり隙間の発生に伴う異音が生じたりせず、またリブと取付金具間でのフレッチングの発生を防止できる。

【００５４】さらに、取付金具の厚みを変更する（弾性材の種類を変えずに）ことによって、ねじりバネ定数を容易に変更できる。

【００５５】(3)　請求項３記載の装置では、カバー部材が補強メンバーとして作用し、各リブの分担荷重が分散されるので、各リブを小形軽量化でき、装置全体の質量を軽減できる。

【００５６】(4)　請求項４記載の装置は、使用中（動力伝達時）に弾性体の周辺に空気を流通させるとともに、弾性体の内部にも空気を流通させて内部から弾性体を冷却することができるので、弾性体の疲労強度がアップし、弾性体の耐久性が向上し、長期間安定して使用できる。

【００５７】(5)　請求項５記載の装置は、弾性材の種類を変更することにより広範囲の用途に適用可能である。

【００５８】(6)　請求項６記載の装置は、たとえば船舶に搭載したディーゼル機関を停止した場合、慣性力により従動軸側から駆動軸側に動力が伝達され、装置が逆転して弾性体に引っ張り作用が生じようとしても、弾性体とは反対側のリブ間に介在させたバネ機構がリブ間の間隙が狭まるのに抗するから、弾性体が引っ張られるのが阻止され、したがって耐久性が向上する。

【００５９】(7)　請求項７記載の装置は、全てが弾性体だけの場合に比べて、ダンピング機能をもつ緩衝装置が一部に組み込まれたことで減衰作用が一層向上され、トルク変動時にもスムーズに動力が伝達される。

【００６０】(8)　請求項８記載の装置では、弾性体本体である弾性材が使用中にたとえば劣化することにより塑性変形（収縮）した場合には、他方のリブ間の間隙が拡大することから、その間隙寸法を計測装置で計測することによって弾性材の永久変形量を検知できる。

【図面の簡単な説明】

【図１】ディーゼル機関側の駆動側軸と従動側軸との間に介設される本発明の圧縮型弾性継手装置の実施例を示す、左半分が断面図、右半分が正面図である。

【図２】図１のＢ－Ｂ線断面図である。

【図３】本発明の他の実施例にかかる圧縮型弾性継手装置の一部を示す、図１に対応する部分断面図である。

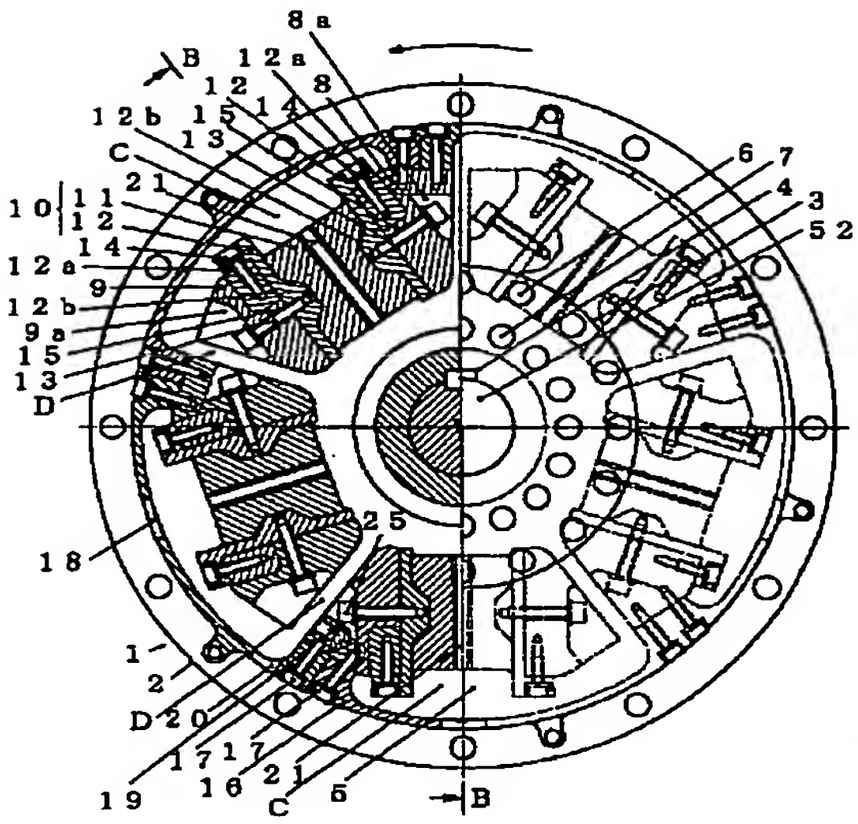
【図４】本発明の他の実施例にかかる圧縮型弾性継手装置の一部を示す、図２に対応する部分断面図である。

【図５】本発明のさらに他の実施例にかかる圧縮型弾性継手装置の一部を示す、部分断面図である。

【符号の説明】

１・１'・１" 圧縮型弾性継手装置
２　駆動側フランジ
３　フランジ
４　キー
５　従動側フランジ
６・１４・１７　ボルト
７　冷却空気用取入口（冷却空気用開口）
８　駆動側リブ
９　従動側リブ
１０　弾性体
１１　本体（弾性材）
１２　取付金具
１３　止めねじ
１５　挿通孔
１６　円筒状カバー部材
１８　空気排出口
１９　間隙計測用孔
２０　間隙計測口
２１　冷却用空気通路（冷却空気用通路）
２２　バネ装填用凹部
２３　コイルバネ
２４　油圧ダンパー
２５　間隙計測装置
２６　スリーブ
５１　駆動側軸
５２　従動側軸
Ｃ・Ｄ　空間部

【図１】


8a
B
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12
8
12b
15
14
13
C
21
10
11
12
14
12a
9
12b
9a
15
13
D
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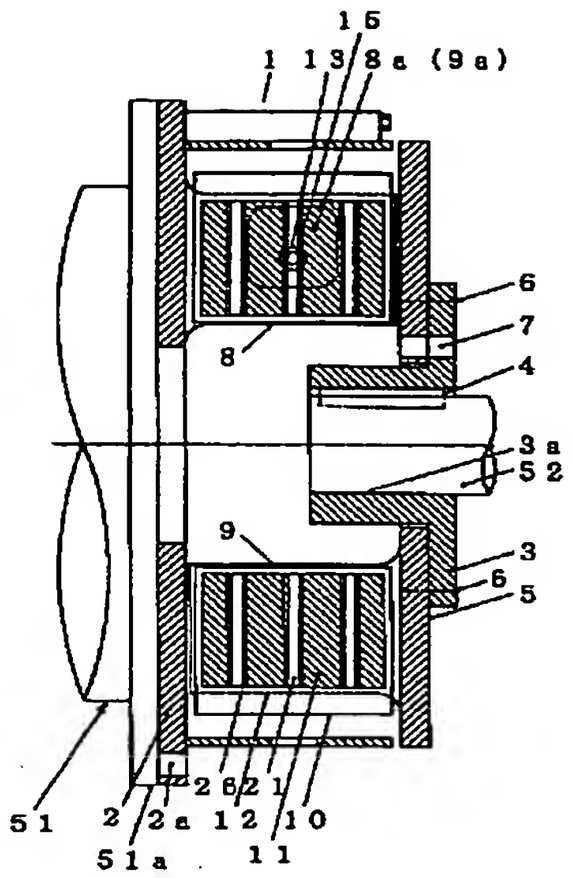
18
1
2
D
20
17
17
19
16
21
C
5
B

【図２】


15
1
13
8a (9a)
6
7
8
4
3a
52
9
3
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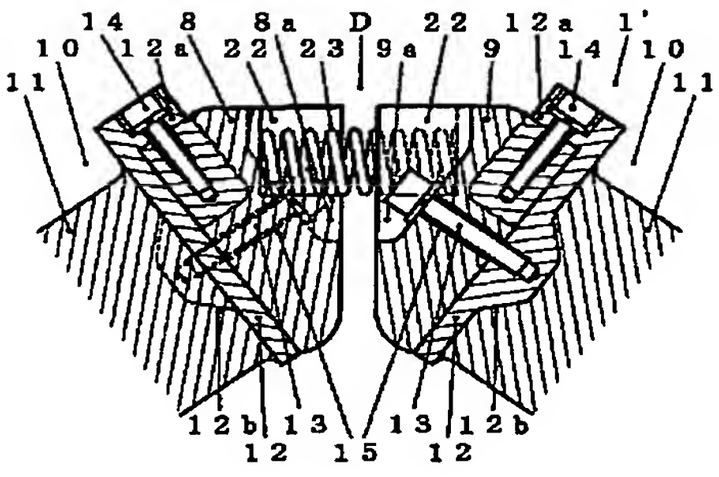
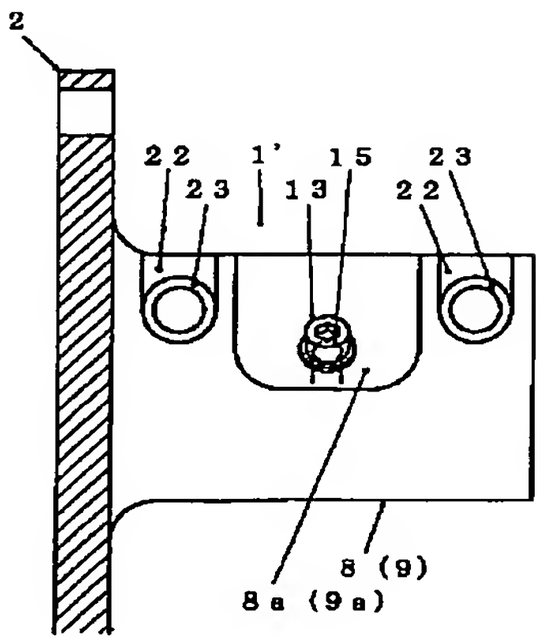
5
26
21
51
2
2a
12
10
51a
11

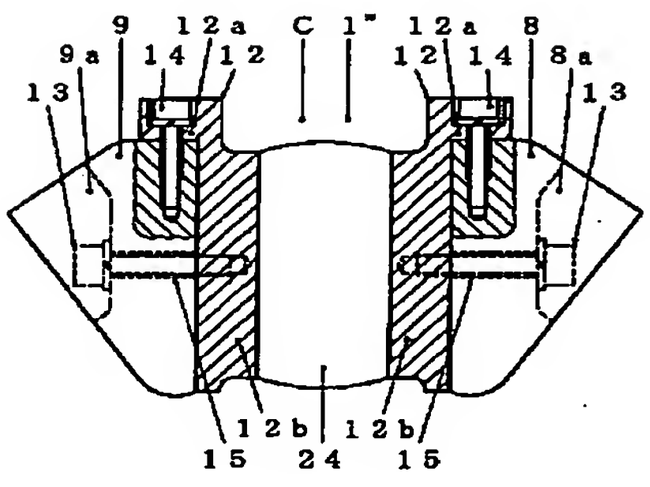
【図３】


14
8
8a
D
22
12a
1'
10
12a
22
23
9a
9
14
10
11
11
12b
13
13
12b
12
15
12

【図４】


2
22
1'
15
23
23
13
22
8 (9)
8a (9a)

【図５】


9
12a
C
1"
12a
8
9a
14
12
12
14
8a
13
13
12b
12b
15
24
15